A Geographic Information System Web-Mapping Approach for Identifying Species and Locations for Ecological Risk Assessments

Thomas Pfleeger
Plant Physiologist
U.S. EPA Office of Research and Development (ORD)/Western Ecology Division (WED)
(541) 754-4374
pfleeger.thomas@epa.gov

Authors: Thomas Pfleeger[1], Connie Burdick[1], John Gabriel[2], Lew Ladd[2], Rachel Schwindt[2], Jeffery Kern[3]
[1]U.S. EPA ORD/WED
[2]Alsea Geospatial
[3]Dynamac Corp.
Keywords: GIS, pesticides, plant testing, intranet Web site, herbicides

In many countries, numerous tests are required prior to chemical registration for the protection of human health and the environment from the unintended effects of chemical releases. Currently, plant testing in the United States requires the use of ten species, selected because they are familiar to scientists, have an extensive history in a variety of experiments, and are easy to manage. There is little evidence to suggest the species currently used are the most sensitive species to all toxicants, therefore these species may not be indicative of the effects that could occur with exposure. Because of the limited scope of the current testing protocol, the uncertainty surrounding the data compels decision makers to make more restrictive choices concerning the level of ecological risk. To address this problem, we have developed a more realistic approach using GIS (Geographic Information System) that allows identification op species most likely to be exposed during chemical application. The GIS system developed for the conterminous United States uses information on crop location, crop diversity, pesticide use rates and wind speed to determine high risk areas. These factors can then be used to determine relevant counties within the U.S. at risk for various exposure scenarios. The 2002 Census of Agriculture (USDA) was used to determine the percentage of land in each county in agriculture. Pesticide application rates were determined from the 2002 Pesticide Use Database from the National Center for Food and Agricultural Policy. Wind data came from the USDA Ventilation Climate Information System. Crops, non-cultivated plants, and threatened/endangered species are then identified from those areas using the GIS. Plant species growing in areas of interest were determined from three databases. Crop species listed by acreage grown in a county came form the Census of Agriculture (USDA). Threatened and endangered species data was obtained from the U.S. Environmental Protection Agency's (U.S. EPA) Office of Pesticide Programs. We will demonstrate the method at the U.S. EPA Science Forum. Results should decrease the uncertainty associated with ecological risk assessment. The Web site has been running within the U.S. EPA since April 2004 and eventually will be available to the public.

This abstract does not necessarily reflect U.S. EPA policy.